

Technology for sustainable consumption Keynote

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Global warming is seen as a real threat to life on earth, for both human and animal species. As our understanding grows regarding the high impact of human activity on climate change, we become more determined to hinder and reverse this process. However, the search for environmental sustainability solutions must be combined with fulfilling the other current needs of our fast-paced society, such as efficiency, comfort and overall improved living standards, as well as greater transparency and social equity in policy and processes. The opportunities offered by growing technological capabilities make it possible to meet these seemingly high-level requirements.

Thus, European Union member states are taking common action to build a more environmentally friendly, sustainable, efficient, transparent, equal, healthy and safe Europe. These actions are planned within Sustainable Development Goals and the European Green Deal strategies and provide a framework for action until 2030 and 2050, respectively.

Both strategies consider production and consumption as central processes which must be considered in the achievement of environmental sustainability. Responsible consumption and production are goal twelve of the Sustainable Development Goals, which focuses on processes involved in harvesting, transport, storage and processing, as well as the recycling of electronic waste. In turn, the European Green Deal involves investing in environmentally friendly technologies, supporting industry to innovate, rolling out cleaner, cheaper and healthier forms of private and public transport, decarbonising the energy sector, ensuring buildings are more energy efficient and working with international partners to improve global environmental standards.

Implementing robust local, national and international policies is central to the development of sustainable practices among governmental entities, organizations, companies and individuals. The lack of policy will make it more difficult to reach the proposed objectives, as it would have to rely on goodwill instead of obligatory compliance. For example, some governments make recycling obligatory and fine individuals who violate recycling laws. Strict nationwide policies regarding waste management in some countries lead to cleaner streets and reduced contamination. Contrariwise, it has been shown that countries which do not have a robust waste management and recycling strategy, face greater contamination problems. This demonstrates the importance of developing sustainability policies across all sectors of our economy, such as transport, manufacturing and commerce.

Consumers find it difficult and time-consuming to determine whether a product is sustainable or not. This is evidenced by research which shows that out of the 65% of consumers interested in buying sustainable products only 25 percent do so. The reason for this is that consumers must make a thorough search for sustainable products on their own. It has been intended to solve this problem by introducing labels (e.g. fair trade) and certificates (e.g. ISO 21930: 2017) that guarantee a product has been produced sustainably and fairly. However, trust in these labels has diminished due to cases of fraud. In this regard, disruptive technologies such as Big Data, Blockchain and the Internet of Things (IoT) can track the product from its very origin until it arrives at the shop, leaving no doubts as to the process the product has undergone and the degree of its sustainability. Given that the data stored in Blockchain is immutable, customers would be able to fully trust information from this source.

Moreover, all customers are different, this means they have different needs and preferences. In today's world, we strive to meet the needs of every individual and provide customized solutions. Thus, technology should not only be used to certify sustainability but also to help customers choose from among these

products. To some, fair pay to all those involved in the production may be more important than the use of natural resources, to others consuming pesticide free products may be a priority. To help customers make optimal decisions rapidly, information tools should be used. Hybrid algorithms employing Deep Neuro-Symbolic Learning models may be used to not only inform but directly recommend products to end consumers, on the basis of the variables defined by the consumer according to their preferences, these may include ecological products or additive-free products. This type of algorithms is explainable, which means that the recommendations made by them are fully transparent to the consumer i.e. the consumer can see the process that led the model to arrive at a certain recommendation, which helps build trust.

State-of-the-art proposals have employed numerous technologies as a means of support for sustainable shopping, however, all have encountered certain limitations. Some examples include Harmonized Food Ontologies or Automated Referral Systems to boost aspects such as data integration, product tracking and guarantee of quality. Unfortunately, these are small scale projects which consider only a small amount of data, this means that they serve for a small group of products, leading to a lack of options for the consumer. This also applies to applications such as Yuka, especially the free version. The paid version of Yuka provides improved functionalities, although few users can afford or feel encouraged to pay for the use of the application's advanced options.

To develop an effective and global sustainable consumption solution, it is therefore necessary to extract a large amount of data and involve many stakeholders in the supply chain. This would make it possible to provide consumers with a wide range of options and make recommendations that are fully suited to their needs in terms of spending, ecology, health and other consumer preferences. A global solution should be able to tell if a product can be obtained at a cheaper price in a different shop or online, or if there are healthier alternatives to a product.

H2020 ASSET Consumerism is a project that strives towards the achievement of sustainable purchase through collective political consumerism. The development consists in a mobile application based on the Internet of Things paradigm. In addition, this tool is designed to assist decision-makers in companies (e.g. supply chain and purchasing managers) as well as policy makers in assessing the overall sustainability of products.

The use of such tools will not only benefit the environment and the consumers. It will also support producers who could promote their products on the sustainable market, among the growing number of consumers interested in buying such products. This solution would grant them an excellent opportunity to stand out and become more competitive on the market. Thus, local, small-scale producers who wish to produce environmentally friendly or additive-free products to meet their clients' needs, are also the target users of this solution. The application would not only help them to showcase their products, but it would also help them assess their sustainability and adapt their production policy to increase it.

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